Your grade: 97.22%

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Next item →

1. What are the four types of geometric transformations? 1 / 1 point

- ○ Rigid, warping, rotation, affine
- ○ Size, parallelism, shear, affine
- ◉ Rigid, similarity, affine, projective

Correct
Yes, these are the four types of geometric transformations, listed from most restrictive (rigid) to least restrictive (projective).

2. What is the most important thing you need to estimate a geometric transformation between two images? 1 / 1 point

- ○ The devices that took the images
- ◉ The locations of matching point pairs on the images
- ○ The resolutions of the images

Correct
Yes, this is the most important thing you need to estimate a geometric transformation. It is also helpful to know the type of transformation, but if you're unsure, you can always try a few different ones.

3. When an affine transformation is applied to an image, which of the following must be true? 1 / 1 point

- ◉ Parallel lines are maintained.
- ○ Sizes of objects stay the same.
- ○ Shapes of objects stay the same.

Correct
Yes, affine transformations allow for changes in translation, scale, and shear, so parallel lines will always be maintained.

4. Feature matching will often produce some incorrect matches. How is the effect of mismatched features reduced when estimating geometric transformations? 1 / 1 point

- ◉ A randomized process that identifies the transformation with the least error and the inlier points that fit the transformation, also known as RANSAC.
- ○ A deterministic process that selects every 3rd matched point pair and calculates the geometric transformation from those pairs.
- ○ A randomized process that selects exactly 2 of the matched point pairs and calculates the geometric transformation from those pairs.

Correct
Yes, MATLAB uses a variant of the RANSAC algorithm to make the geometric transformation process more robust.

5. When you perform image registration in the Registration Estimator app, which image is being aligned? 1 / 1 point

- ◉ The moving image is aligned with the fixed image.
- ○ The fixed image is aligned with the moving image.
- ○ Both images are aligned to a different third coordinate system.

Correct
Yes! The moving image is the one being registered, or aligned, with the fixed image.

6. Which of the following can you do in the Registration Estimator app? Select all that apply. 1 / 1 point

- ☑ Change the quality of matched features

Correct
Yes, you can use the slider to change the quality of matched features in the "Feature Parameters" section on the right.

- ☑ Change the number of detected features

Correct
Yes, you can use the slider to change the number of detected features in the "Feature Parameters" section on the right.

- ☑ Change the transformation type

Correct
Yes, you can change the type of transformation in the "Feature Parameters" section on the right.

7. In the image registration workflow, you typically: 1 / 1 point

- perform detection, extraction, and matching of features,
- estimate the geometric transformation using the matched feature locations,
- and align the images.

When you manually select control points to perform registration, which of these three steps are you

replacing?

- ○ Estimating the geometric transformation
- ◉ Detection, extraction, and matching
- ○ Aligning the images

Correct
Yes, by manually selecting control points, you are identifying the matched point pairs. You then use the locations of the selected points to estimate the geometric transformation.

8. When might you use the Control Point Selection Tool as opposed to the Registration Estimator app? Select that apply. 0.6666666666666666 / 1 point

- ☑ If it is difficult to perform feature matching on your images

Correct
As you saw in "Visually Selecting Control Points," the Control Point Selection Tool can be very helpful when it is difficult to match features, like stars.

- ☑ If you're only working with a few images

Correct
The Control Point Selection Tool is a great option if you're working with a small number of images.

- ☑ If you're not sure what kinds of features or transformation to use, and you want to quickly try many approaches.

This should not be selected
The Registration Estimator app is the best choice for situations like these.

Instructions for Questions 9-12

Questions 9-12 all work with a single registration example. Before starting this section, please run the `setupModule3Quiz` function provided in the course files by going to the Command Window and typing:

```
setupModule3Quiz
```

This will generate one of the two images you will use in this section ("venice_oli_adj.jpg").

9. In MATLAB, import the two images with the following code: 1 / 1 point

```
img1 = imread("venice_msi_2021308_lrg.jpg");
img2 = imread("venice_oli_adj.jpg");
```

and open the Control Point Selection Tool with `img1` as the fixed image and `img2` as the moving image. Which of the following lines of code accomplishes this?

- ○
```
cpselect(img1,img2)
```
- ◉
```
cpselect(img2,img1)
```
- ○ Neither

Correct
The first input of `cpselect` should be the moving image and the second should be the fixed image.

10. With the `cpselect` tool open, you can see the images side by side. These two images only differ by rotation, scaling, and translation. Which type of geometric transformation is it and what is the minimum number of matching point pairs you need to select for this type? 1 / 1 point

- ○ Affine, 2 pairs
- ○ Rigid, 2 pairs
- ◉ Similarity, 2 pairs

Correct
Yes, a similarity transformation can have differences in translation, rotation, and scale, and it only requires 2 matched point pairs.

11. Recall that you usually want to select more than minimum number of matched pairs because it is difficult to perfectly identify same spot on two images. In this case, try selecting 4 or 5 pairs of matching points, and then 1 / 1 point

export the points to the workspace. Which of the following lines do you use to estimate the geometric transformation?

- (●)
```
[tform,inlierIdx] = estgeotform2d(movingPoints,fixedPoints,"similarity");
```
- ( )
```
[tform,inlierIdx] = geometrictransformation(fixedPoints,movingPoints,"rigi
```
- ( )
```
[tform,inlierIdx] = estgeotform2d(fixedPoints,movingPoints,"rigid");
```
- ( )
```
[tform,inlierIdx] = geometrictransformation(movingPoints,fixedPoints,"simil
```

Correct
Yes, this is the correct function to estimate the geometric transformation! Remember that it needs the matched point locations as well as the transformation type as inputs.

12. You're almost done! You can now visualize the result with the following code: 1 / 1 point

```
warpedImg2 = imwarp(img2,tform,"OutputView",imref2d(size(img1)));
imshowpair(img1,warpedImg2)
```

What do you think of the result?

- (●) It looks great!
- ( ) It doesn't seem to look correct.

Feedback
Awesome! Now, you can try to perform this same registration with a feature-based approach, using the Registration Estimator app.